CLAIMS:

I claim:

1. An installation tool for installing retaining rings on a shaft or in a bore, the shaft or bore having a given diameter, comprising:

an elongated body having a first preselected length that extends between first and second opposing ends of the body, the first end being a tool driving end and the second end being a tool installation end, said body including a hollow portion with a cavity formed therein which extends from the tool installation end rearwardly into said body, the hollow cavity extending axially within said body for a second preselected length, the second preselected length being less than the first preselected length, the difference of said first and second preselected lengths defining a solid portion of said body that abuts said hollow cavity and which provides a surface by which to apply a force to said tool during operation thereof, said hollow cavity being surrounded by a sidewall of said body, the sidewall being integrally formed with said body solid portion;

a plurality of elongated slots formed in said sidewall and extending from said tool installation end rearwardly lengthwise along said body for said second preselected length, the slots defining a plurality of individual contact arms that extend in a cantilevered fashion, lengthwise from said solid portion, the contact arms being bent in a direction transverse to a central longitudinal axis of said body such that a diameter of said cavity varies in size between said tool installation end and said tool driving end, and,

each of said contact arms having an enlarged free end for contacting a retaining ring, the contact arm enlarged ends each including a flat retaining ring-contacting face that extends at an angle to the central longitudinal axis of said tool.

2. The retaining ring installation tool of claim 1, wherein said contact arms are bent radially outwardly from said tool central longitudinal axis such that a diameter of said tool installation end is greater than a diameter of said tool driving end.

3. The retaining ring installation tool of claim 1, wherein said contact arms are bent radially inwardly toward said tool central longitudinal axis such that a diameter of said tool installation end is less than a diameter of said tool driving end.

4. The retaining ring installation tool of claim 1, wherein said contact arm flat retaining ring-contacting faces are perpendicular to said tool central axis.

5. The retaining ring installation tool of claim 1, wherein said contact arms have a thickness that is constant from said body solid portion and which increases at said contact arm enlarged ends.

6. The retaining ring installation tool of claim 1, wherein said contact arms are arranged in a symmetrical fashion around said tool central axis.

7. The retaining ring installation tool of claim 1, wherein said slots vary in width lengthwise along said tool body.

8. The retaining ring installation tool of claim 7, wherein said slots have a smaller width at said installation end and said widths increase in width rearwardly lengthwise of said tool body.

9. The retaining ring installation tool of claim 1, wherein said hollow cavity extends rearwardly of said slots so as to reduce stress concentration where said contact arms extend from said body solid portion.

10. The retaining ring installation tool of claim 1, further including an annular recess formed on the exterior of said tool body, and said hollow cavity extends rearwardly of said annular recess.

11. The retaining ring installation tool of claim 1, further including an annular recess formed on the exterior of said tool body, the annular recess defining an angled transition surface where said contact arms extend from said solid body portion, said hollow cavity extending rearwardly of said annular recess.

12. The retaining ring installation tool of claim 1, wherein said tool is made from a metal having an ultimate tensile strength of at least 150,000 psi (pounds/square inch).

13. A retaining ring installation tool for use in manually installing retaining rings onto shafts and in bores, the tool being capable of manual use without the need for excessive force being applied thereto, said tool comprising:

a cylindrical metal body portion having a preselected first length, a substantially solid driving end with a reaction surface for applying a ring application driving force to said tool, and an insertion end with a plurality of individual ring-contacting surfaces disposed thereon;

an internal cavity extending longitudinally within the body portion from the insertion end toward the solid driving end, the internal cavity having a second preselected length which is less than the first preselected length, said internal cavity defining an annular sidewall that surrounds said internal cavity, the annular sidewall being integrally formed with said solid driving end;

said sidewall including a plurality of longitudinal slots formed therein, the slots being circumferentially spaced around said sidewall to thereby define a plurality of contact arms that extend from in a cantilevered fashion from said solid end to said insertion end, the contact arms terminating in free ends, the ring-contacting surfaces being disposed on said free ends and extending at an angle to a longitudinal axis of said tool; and,

an annular recess formed on an exterior surface of said body portion, the annular recess defining a uniform thickness of said contact arms in their extent from said solid driving end to said insertion end, one end of said annular recess being spaced apart from said contact free arms to thereby define a plurality of enlarged end portions of said contact arms, each of the enlarged end portion supporting a single ring-contacting surface thereon.

14. The installation tool of claim 13, wherein said internal cavity has a preselected diameter throughout its length.

15. The installation tool of claim 13, wherein said contact arm free ends are bent toward the tool longitudinal axis such that said internal cavity has a diameter that varies along its length, the internal cavity diameter proximate said tool solid driving end being larger than said internal cavity diameter proximate said tool insertion end.

16. The installation tool of claim 13, wherein said contact arm free ends are bent away from the tool longitudinal axis such that said internal cavity has a diameter that varies along its length, the internal cavity diameter proximate said tool solid driving end being smaller than said internal cavity diameter proximate said tool insertion end.

17. The installation tool of claim 13, wherein said annular recess has a third preselected length which is less than said first preselected length.

18. The installation tool of claim 13, wherein the annular recess third preselected length is less than said second preselected length.

19. The installation tool of claim 18, wherein said solid driving end is tapered to meet said annular recess.

20. The installation tool of claim 13, wherein said tool is made from a metal having an ultimate tensile strength of at least 150,000 psi (pounds/square inch).